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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/775,838	02/01/2001	Toshio Hata	299002051900	1157

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EXAMINER

LE, THAO X

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 06/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/775,838

Applicant(s)

HATA ET AL.

Examiner

Thao X Le

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. The indicated allowability of claims 14-15 in Paper No. 10 is withdrawn in view of the newly discovered reference(s) to Ishikawa. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

3. Claim 1-4 and 6-11, 16 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,242,761 by Fujimoto et al.

Regarding to claim 1, Fujimoto discloses in fig. 1 a gallium nitride (GaN) compound semiconductor light emission device comprising: a substrate 101, a n-type electrode region 104/103 comprising an n-type transmissive electrode 130, a GaN compound semiconductor multiplayer structure including active layer 107, a p-type electrode region 114/113 comprising a p-type transmissive electrode 131, wherein the n-type transmissive electrode and p-type transmissive electrode are thin film so as to be substantially transparent, because of the inherent material properties and structure disclosed. In re Best, 195 USPQ 430, 433 (CCPA 1977).

Regarding to claim 2, Fujimoto discloses a GaN compound light-emitting diode (LED), wherein the p-type transmissive electrode 131 and the n-type transmissive electrode 130 transmit light, which is generated in the active layer 107 and reflected from the substrate so that light exits the light emission device, fig. 1.

Regarding to claim 3-4, 16 Fujimoto discloses a GaN compound LED, wherein the n-type transmissive electrode is located outside and is formed at least partially or completely around a circumference of the p-type transmissive electrode, fig. 1. The fig. 1 is the side view of the device and the top view (not shown) would have shown the surrounding structure as claimed, because of the inherency of the structure.

Regarding to claim 6-8, Fujimoto discloses a GaN compound LED wherein the n-type and p-type electrode region further comprises an n-type and p-type pad electrode, column 7 line 37-41, are provided substantially along one side of a GaN compound, and the p-type pad is formed in the vicinity of the center of the emitting face of the gallium nitride compound, fig. 1

Regarding to claim 9, Fujimoto discloses a GaN compound LED wherein the n-type transmissive electrode comprises at least one of the thin metal film, column 7 lines 3-4.

Regarding to claim 10, Fujimoto teaches a gallium nitride compound semiconductor LED wherein the n-type pad electrode is of a type, which realizes a Schottky contact, because of the inherent property.

Regarding to claim 11, Fujimoto teaches a gallium nitride compound semiconductor LED device wherein the n-type pad electrode comprises an alloy of Au, column 7 lines 38-39.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 13 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5739554 to Edmond et al.

Regarding to claim 13, Edmond discloses in fig. 2 a GaN compound semiconductor LED comprising: a conductive substrate 41, a n-type electrode region 41/43 comprising an n-type transmissive electrode 51/55/57, a non-conductive buffer layer 42 provided on the substrate 41, a GaN compound semiconductor multiplayer structure including active layer 46 provided on the buffer layer 42, and a p-type electrode region 50 comprising a p-type transmissive electrode 53 provided on the GaN compound semiconductor multiplayer structure, wherein the n-type transmissive electrode 51/55/57 is formed on the lower face of the substrate 41, a side face of the buffer layer 42, and a side face of the n-type GaN compound semiconductor multiplayer structure in a region neighboring the buffer layer.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claim 5 rejected under 35 U.S.C. 103(a) as being unpatentable over US 6242761 to Fujimoto et al. in view of US 5369289 to Tamaki et al.

Regarding to claim 5, Fujimoto discloses a gallium nitride (GaN) compound light-emitting diode (LED) wherein the GaN compound semiconductor multiplayer structure includes a buffer layer 102 and a n-type GaN transmissive electrode 130/140.

But Fujimoto does not expressly disclose a gallium nitride (GaN) compound light-emitting diode (LED) wherein n-type transmissive electrode is formed on a side of the substrate, a side face of the buffer layer, and a side face of the n-type GaN compound semiconductor layer in a region neighbor the buffer layer.

However, Tamaki reference discloses the a gallium nitride (GaN) compound light-emitting diode (LED) having multiple layer structure, fig. 11-15, wherein n-type transmissive electrode 8 is formed on a side of the substrate 1, a side face of the buffer layer 2, and a side face of the n-type GaN compound semiconductor layer 3 in a region neighbor the buffer layer. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the transmissive electrode 8 teaching of Tamaki to replace the n-type GaN transmissive electrode 130/140 of Fujimoto, because it would have resulted in an improvement of light emission efficiency as taught by Tamaki, column 7 line 9-12.

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9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6242761 to Fujimoto et al in view of US 6130446 to Takeuchi et al.

Regarding to claim 12, Fujimoto does not expressly disclose the n-type and p-type transmissive electrodes are of a thickness of 30nm or less.

However, Fujimoto discloses the n-type and p-type transmissive electrodes are multiplayer having various thickness, column 6 line 66-67 and column 7 lines 25-30. In addition, Takeuchi discloses the Ni and Au are used as a transparent metal film electrode having different thickness, see Table 1, and the transparency can be adjusted by decreasing the thickness, column 1 lines 39-45. Accordingly, it would have been obvious to one of ordinary skill in art to use the electrode thickness teaching of Takeuchi in Fujimoto GaN compound in the range as claimed, because it has been held that where the general conditions of the claims are discloses in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

10. Claims 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over by US 5739554 to Edmond et al. in view of US 5977565 to Ishikawa et al.

Regarding to claim 14, Edmond discloses in fig. 2 a GaN compound semiconductor LED comprising: a substrate 41, a n-type electrode region 41/43 comprising an n-type transmissive electrode 51/55/57, a buffer layer 42 provided on the substrate 41, a GaN compound semiconductor multiplayer structure including active layer 46 provided on the buffer layer 42, and a p-type electrode region 50 comprising a p-type transmissive electrode 53 provided on the GaN compound semiconductor multiplayer structure, wherein the n-type transmissive electrode

51/55/57 is formed on the lower face of the substrate 41, a side face of the buffer layer 42, and a side face of the n-type GaN compound semiconductor multiplayer structure in a region neighboring the buffer layer.

However, Edmond does not expressly disclose the n-type transmissive electrode comprises an oxide semiconductor.

But, Ishikawa reference discloses the LED in fig.2(a) wherein the electrode 107 comprises ITO, SnO₂, or translucent Ni or Au, column 6 lines 63-67. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of transparent electrode teaching of Ishikawa to replace the n-type electrode of Fujimoto, because it would have increased an area for the emitted light as taught by Ishikawa, column 7 lines 1-2. Furthermore, it would have been obvious to one of ordinary skill in the art to use oxide semiconductor electrode teaching of Ishikawa the replace the Edmond's electrode, because such material substitution would have been considered a mere substitution of art-recognized equivalent values.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6242761 to Fujimoto et al. in view of US 5977565 to Ishikawa et al.

Regarding to claim 15, Fujimoto discloses in fig. 1 a GaN compound semiconductor LED comprising: a substrate 101, a n-type electrode region 104/103 comprising an n-type transmissive electrode 130, a GaN compound semiconductor multiplayer structure including active layer 107, a p-type electrode region 114/113 comprising a p-type transmissive electrode 131, wherein the n-type transmissive electrode and p-type transmissive electrode are film so as to

be substantially transparent, because of the inherent material properties and structure disclosed.
In re Best, 195 USPQ 430, 433 (CCPA 1977).

However, Fujimoto does not expressly disclose the n-type transmissive electrode comprises a thick film of ITO.

But, Ishikawa reference discloses the LED in fig.2(a) wherein the electrode 107 comprises ITO, SnO₂, or translucent Ni or Au, column 6 lines 63-67. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of transparent electrode teaching of Ishikawa to replace the n-type electrode of Fujimoto, because it would have increased an area for the emitted light as taught by Ishikawa, column 7 lines 1-2.

Response to Arguments

12. Applicant's arguments filed 04/14/03 have been fully considered but they are not persuasive. In response the Applicant's argument that the reference fails to how certain feature of Applicant's invention, it is noted that the feature upon which the Applicant relies, i.e., a n-type and p-type thin transmissive electrode being on the order of a few nanometers, e.g., 2 – 30 nm as described in the specification, are not recited in the rejected claim. Although the claim are interpreted in light of the specification, limitation from the specification are not read into the claim, see In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The argument on the ground that Fujimoto does not discloses

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Thao X. Le
June 4, 2003



PHAT X. CAO
PRIMARY EXAMINER